NON-PUBLIC?: N
ACCESSION #: 9407010303
LICENSEE EVENT REPORT (LER)

FACILITY NAME: PALO VERDE UNIT 2 PAGE: 1 OF 7

DOCKET NUMBER: 05000529

TITLE: REACTOR TRIP CAUSED BY PERSONNEL ERROR
EVENT DATE: 05/28/94 LER #: 94-002-00 REPORT DATE: 06/23/94

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 86

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: BURTON A. GRABO, SUPERVISOR, NUCLEAR TELEPHONE: (602) 393-6492
REGULATORY AFFAIRS

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On May 28, 1994, at approximately 1115 MST, Palo Verde Unit 2 was in Mode 1 (POWER OPERATION) operating at approximately 86 percent power when the Unit sustained a reactor trip. The trip was due to a low Departure from Nucleate Boiling Ratio signal which was a result of Reactor Coolant Pump (RCP) 1B tripping on a phase-to-phase electrical fault. The plant responded normally to the event. No safety functions were challenged and no Engineered Safety Features Actuation System actuations were received or required. The Control Room Supervisor classified the event as an uncomplicated reactor trip at 1130 MST and the Unit was stabilized in Mode 3 (HOT STANDBY). Management has conducted briefings with Operation and Maintenance personnel regarding the circumstances of the event. The 1B RCP supply cables and the penetration termination box have been repaired. At approximately 1515 MST on June 2, 1994, the Plant Review Board reviewed the status of the recovery/restart plan and approved entry

into Mode 2 (STARTUP). Unit 2 returned to 86 percent power at approximately 1235 MST on June 5, 1994. An investigation of the event is continuing.

There have been two previous similar events (LER 528/88-011 and 529/92-006) reported pursuant to 10CFR50.73.

END OF ABSTRACT

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

At approximately 1115 MST on May 28, 1994, Palo Verde Unit 2 was in Mode 1 (POWER OPERATION) at normal operating temperature and pressure.

B. Reportable Event Description (Including Dates and Approximate Times of Major Occurrences):

Event Classification: An event that resulted in the automatic actuation of the Reactor Protection System (RPS).

At approximately 1115 MST on May 28, 1994, Unit 2 sustained a reactor trip on a low Departure from Nucleate Boiling Ratio (DNBR) signal. The low DNBR signal was the result of the 1B Reactor Coolant Pump (RCP)(AB) tripping on a phase-to-phase electrical fault. The plant responded normally to the event and no safety functions were challenged. No Engineered Safety Features Actuation System (ESFAS) actuations were received or required. The Control Room Supervisor (utility, licensed) classified the event as an uncomplicated reactor trip at approximately 1130 MST and the Unit was stabilized in Mode 3 (HOT STANDBY).

Approximately two hours prior to the event, Control Room personnel (utility, licensed) had authorized troubleshooting and replacement of the sub-group K111 relay (RLY) in the A Train ESFAS (JE) relay cabinet. The function of the sub-group K111 relay is to provide an open signal to the A Train Containment Spray (CS)(BE) isolation valve (ISV), SIA-UV-672. This occurs when a Containment Spray Actuation Signal (CSAS) is initiated by a high-high containment pressure signal of 8.5

pounds per square inch gage (PSIG).

The work to be performed by the Maintenance technicians (utility, nonlicensed) required access to the A Train ESFAS relay cabinet. Therefore prior to starting work, SIA-UV-672 was isolated and down-powered by Operations personnel to prevent it from opening. Earlier, each technician had been involved in different aspects of the work. One had been testing the new relay and the other was briefing Control Room personnel and preparing the work area. Both technicians returned to the Control Room together to begin work, and setup in front of the incorrect ESFAS relay cabinet.

Work was started without independent verification of the train to be worked on. The technicians inadvertently removed the sub-group K111 relay in the B Train ESFAS relay cabinet. The removal of the this relay caused the B Train CS isolation valve, SIB-UV-671, to receive an open signal. The opening of SIB-UV671 resulted in a flow path which allowed water to gravity drain from the Refueling Water Tank (RWT)(BQ) into Containment through the 140 and 120 foot elevation auxiliary CS nozzles (BE). There were no audible alarms warning the operators of the valve opening.

There are a total of 620 CS nozzles. 160 are located in the auxiliary headers below the 140 and 120 foot levels of Containment. Nozzles in the auxiliary headers are designed to deliver 3.0 gallons per minute each at 40 pounds per square inch differential (PSID). During this event, the CS pumps (P) did not start. The level differential between the auxiliary spray nozzles and the RWT provided the driving head.

Approximately 7000 gallons of borated water entered the Containment (NH) over a period of approximately 1 hour and 55 minutes. This volume represents about a one percent change in RWT level which was not noticeable to the Control Room staff. Some of the borated water flowed down on and entered an RCP penetration termination box (JBX) which contained the 1B RCP power leads (JX). The water intrusion caused the exposed 13.8 kV connectors of the power leads to short circuit causing the 1B RCP power supply breaker (BKR) to trip on instantaneous overcurrent. This caused the RPS to generate a low DNBR trip signal resulting in a reactor trip.

Prior to the trip, Control Room personnel were in the process of conducting high rate blowdowns of the Steam Generators (SG)(AB). At approximately 0944 MST, the east Containment Sump level alarm (IA) annunciated in the Control Room. Using approved procedures, the sump level alarm was investigated and a reactor water inventory balance was initiated. The SG blowdowns were terminated and the lineup secured. The Control Room staff verified an increasing east sump level and increasing Containment humidity. No Radiation Monitors (IL) were in alarm at the time of the event. Trending of the sump level increase was started and preparations for a Containment entry were initiated.

A Containment entry was made at approximately 1108 MST to identify the source of the water. Prior to identifying the source of water, the Reactor tripped. Once water was visually identified as coming from the auxiliary CS nozzles, Control Room

personnel identified that SIB-UV-671 was open. Valve SIB-UV-671 was closed at approximately 1131 MST terminating the flow of water into Containment.

Containment components within the area affected by the spray of borated water from the auxiliary CS nozzles were visually inspected by teams comprised of Engineering and Maintenance personnel. The inspection found two RCP penetration termination boxes (1A and 1B), one coil box, and one nozzle dam test panel (PL) with evidence of water intrusion. Repairs to the affected enclosures along with the repairs to the 1B RCP penetration termination box were completed. In addition, the remaining RCP penetration termination boxes were inspected and returned to NEMA-4 drip-tight standards. A cleanup of Containment followed a detailed walkdown prior to close out of the Containment.

An incident investigation is continuing to be conducted into the event. At approximately 1515 MST on June 2, 1994, the Plant Review Board reviewed the status of the recovery/restart plan and approved entry into Mode 2 (STARTUP). Unit 2 returned to 86 percent power at approximately 1235 MST on June 5, 1994.

C. Status of structures, systems, or components that were inoperable at the start of the event that contributed to the

event:

Not applicable - no structures, systems, or components were inoperable at the start of the event which contributed to this event.

D. Cause of each component or system failure, if known:

Not applicable - no component or system failures were involved.

E. Failure mode, mechanism, and effect of each failed component, if known:

Not applicable - no component failures were involved.

F. For failures of components with multiple functions, list of systems or secondary functions that were also affected:

Not applicable - no failures of components with multiple functions were involved.

G. For a failure that rendered a train of a safety system inoperable, estimated time elapsed from the discovery of the failure until the train was returned to service:

Not applicable - no failures that rendered a train of a safety system inoperable were involved.

H. Method of discovery of each component or system failure or procedural error:

Not applicable - there have been no component or system failures or procedural errors identified. There were no procedural errors which contributed to this event.

I. Cause of Event:

The cause of the event was a cognitive personnel error made by the Maintenance technicians failing to verify the correct equipment before commencing work. Prior to the event, one of the Maintenance technicians had prestaged equipment in the general location of the work activity. After the tailboard briefing, the other Maintenance technician went to the work location and did not verify the equipment had been staged at

the correct train. The first technician had left the equipment by the incorrect train ESFAS cabinet.

No unusual characteristics of the work location (e.g., noise, heat, poor lighting) directly contributed to this event. However, the lack of formal communications between the Maintenance technician and Operation Department personnel as well as between the two Maintenance technicians contributed to this event (SALP Cause Code A: Personnel Error).

An independent investigation of this event is being conducted in accordance with the APS Incident Investigation Program. If information is developed which would affect the reader's understanding or perception of this event, a supplement to this LER will be submitted.

J. Safety System Response:

Not applicable - there were no safety system responses and none were necessary.

K. Failed Component Information:

Not applicable - no component failures were involved.

II. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THIS
EVENT:

Nuclear Fuel Management personnel (utility, nonlicensed) determined that this event did not result in a transient more severe that those already analyzed. The loss of 1B RCP caused an automatic reactor trip when low DNBR signals were received on two RPS channels. Other equipment and systems assumed in the Updated Final Safety Analysis Report (UFSAR), Chapter 15 were functional and performed as required. Scenarios defined in UFSAR Chapter 6 concerning a Loss of Coolant Accident (LOCA) were not challenged during this event. A review of RCS average temperature, pressure, and level plots indicated that adequate subcooled margin was maintained throughout the event and RCS conditions posed no threat to fuel integrity. Peak RCS pressure was approximately 2245 pounds per square inch absolute (PSIA) and is below the Safety Limit of 2750 psia. Therefore, the event did not result in any challenges to the fission product barriers or result in any releases of radioactive materials.

There were no adverse safety consequences or implications as a result of this event. This event did not adversely affect the safe operation of the plant or the health and safety of the public.

III. CORRECTIVE ACTION:

A. Immediate:

Once water was identified as coming from the auxiliary CS nozzles, Control Room personnel determined that CS Isolation Valve SIB-UV-671 was open and at approximately 1131 MST, the valve was closed terminating the flow of water into Containment.

The penetration termination box containing the 1B RCP supply cables was replaced, the cables repaired, and equipment checks completed.

The remaining Unit 2 RCP penetration termination boxes were inspected and returned to NEMA-4 drip-tight standards. Containment components within the area affected by the water from the auxiliary spray nozzles were visually inspected by a team comprised of Engineering and Maintenance personnel. A cleanup was conducted and no other significant problems were identified.

Unit 3 Containment termination boxes were inspected for adherence to NEMA-4 drip-tight standards. No problems were identified.

Unit 1 Containment termination boxes were inspected for adherence to NEMA-4 drip-tight standards. No problems were identified.

A plant stand-down was conducted with

o Maintenance personnel to discuss the event and management expectations associated with communications and train verification, and

o Operations personnel, including STAs, to discuss the event including communications with non-departmental personnel and the mitigating actions taken during the event.

Both Maintenance technicians also received coaching from their Team Leader and Senior Management.

B. Action to Prevent Recurrence:

The PVNGS Training Department will review the contents of this LER and the associated Incident Investigation for inclusion into applicable training programs. This review will be conducted and completed in accordance with Training Department procedures.

An independent investigation of this event is continuing to be conducted in accordance with the APS Incident Investigation Program. The investigation is expected to be completed by June 27, 1994. If additional corrective actions or information is developed which would affect the reader's understanding or perception of this event, a supplement will be submitted.

IV. PREVIOUS SIMILAR EVENTS:

There have been two previous events reported pursuant to 10CFR50.73 (LER 528/88-011 and 529/92-006) where personnel error (operating the wrong equipment) resulted a reactor trip. Cognitive personnel errors that are the result of inattention to detail are not normally correctable with revised procedures or additional training. Therefore, the corrective actions for the previous event would not have prevented this event.

ATTACHMENT TO 9407010303 PAGE 1 OF 1

Arizona Public Service Company
PALO VERDE NUCLEAR GENERATING STATION
P.O. BOX 52034 o PHOENIX, ARIZONA 85072-2034

JAMES M. LEVINE 192-00897-JML/BAG/RJR
VICE PRESIDENT June 23, 1994
NUCLEAR PRODUCTION

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Mail Station P1-37
Washington, D.C. 20555

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)

Unit 2
Docket No. STN 50-529 (License No. NPF-51)
Licensee Event Report 94-002-00
File: 94-020-404

Attached please find Licensee Event Report (LER) 94-002 prepared and submitted pursuant to 10CFR50.73. This LER reports the Reactor trip which occurred on May 28, 1994. In accordance with 10CFR50.73(d), a copy of this LER is being forwarded to the Regional Administrator, NRC Region IV.

If you have any questions, please contact Burton A. Grabo, Supervisor, Nuclear Regulatory Affairs, at (602) 393-6492.

Sincerely,

JML/BAG/RR/rjr

Attachment

cc: W. L. Stewart (all with attachment)
L. J. Callan
K. E. Perkins
K. E. Johnston
INPO Records Center

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